

1,132,161

# PATENT SPECIFICATION

DRAWINGS ATTACHED

1,132,161



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## COMPLETE SPECIFICATION

### Improvements in or relating to Ventilators

I, HEINZ GEORG BAUS, a German citizen of 28 Am Oberen Luisenpark, Mannheim, Germany, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention concerns improvements in or relating to ventilators.

It is an object of the invention so to construct a ventilator that it can be manufactured easily and can be fitted without difficulty above a window, a door or the like, in the wall.

Furthermore, the invention is concerned with providing a reliable connection between the ventilator housing — which is of box section and open on one side — and the closure thereof.

According to the invention there is provided a ventilator adapted to be mounted in a window, door or wall opening and comprising a box like housing open on one side and having on the open side a closure including a movable flap; the top and bottom of said housing each having on their edge facing the open side a continuous ledge and spaced inwardly therefrom a projection, said closure having at the top and bottom thereof grooves adapted to receive said ledges and rearwardly directed resilient strips the ends of which are engageable with said projections.

Preferably the said projections are in the form of ribs having rounded or inclined surfaces which are engaged by hook like ends on said resilient strips.

The said flap may be provided with supporting strips extending along its inner side by which flap setting means are connected to the flap.

It will be understood that ventilators according to the invention can function as air exchanging devices between the interior and exterior of a room merely as a result of differentials in pressure or temperature. I may however provide a ventilator according to the

invention with a motor driven blower in an air guiding housing, a wall of said air guiding housing which bounds a discharge opening therefrom being rigidly connected to an inwardly protruding rib on the bottom of the box like housing.

Finally the invention is also concerned with the construction of a switch-over device which not only switches the motor on and off but additionally opens and closes the flap of the housing.

A preferred embodiment by way of example of a ventilator according to the invention is diagrammatically shown in the accompanying drawings in which:—

Fig. 1 is a partial axial section on the line A—A of Fig. 2,

Fig. 2 is a radial section on the line B—B of Fig. 1,

Fig. 3 is a section on the line C—C of Fig. 1,

Fig. 4 is a diagrammatic and simplified longitudinal section through the housing of the motor which serves to actuate the flap member,

Fig. 5 is an axial front view of the housing of said motor.

Fig. 6 is the switching circuit, and

Fig. 7 is a broken front view of the whole arrangement.

The ventilator of the invention comprises a box section formed in a single piece in an extrusion press from a light metal, such as an aluminium alloy, or from a plastic, and it is cut to length (for example that of a window front of 6m.), has a top 1, an inclined wall 2, a rear wall 3 and a bottom 4. On the edges facing the open side of the box section, the top 1 and the bottom 4 have protruding ledges 5 and 6 which are offset with respect to the opening. At the inner ends of these ledges projections in the form of continuous ribs 7 and 8 having rounded surfaces. A lower closure portion 9 and an upper closure portion 10 have in the plane of the bottom 4 and of the top 1 respectively shoulders 11, 12 which together

[Price 4s. 6d.]

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with reinforcements 13, 14 embrace grooves 15, 16 which receive the ledges 5, 6. These reinforcements 13, 14 also carry inwardly protruding, resilient strips 17, 18 which are provided with hooks 19, 20 at their inner ends and which taper towards them. The downwardly or upwardly pointing surfaces of the hooks 19, 20 engage behind the inwardly directed surfaces of the ribs 7, 8. The closure portions 9, 10 are securely held in position as a result of the resilience of the strips 17, 18.

The lower closure portion 9 has a bracker 21 which via a strip 22 carries a continuous pivotal axis 23. This continuous pivotal axis 23 is embraced by a slotted bearing block 24 which is integral with a flap member 26 since it has been produced in an extrusion press together with this flap. In the upper part the flap 26 engages a stop 27 which with the upper closure portion 10, consists of a single extrusion-pressed piece. The flap 26 has supporting strips 28 and 29 which serve for the insertion of a plate 30 carrying a resilient angle member 31, 32 which is connected to a return spring 33. The space bounded by portion 9, 10, 26 (see Fig. 7) which can generally contain a motor, two blowers and a flap adjusting device, has approximately the length of a flap e.g. 50 cm.

The lower and upper closure portions 9, 10 have flanges 33, 34 which are situated in the front plane and serve to cover up damage to the brickwork. If holes are provided, they can also serve for the mounting of the closure portions on the wall.

Between two portions each having a flap 26 which portions are not immediately abutting adjacent to each other the box section can be closed by unitary moulded closure members having no opening therein, said closure members being shaped so as to include the above mentioned parts 34, 11, 16, 14, 18, 20, 10, 26, 9, 13, 17, 19, 15, 12, 33. Thus in such closure members the part corresponding to flap 26 is fixedly connected to 9 and 10.

Near the rear wall 3 the bottom 4 can carry longitudinal grooves 35, 36 which make it possible to punch out apertures 37 for the passage of air at a desired place and of appropriate shape and size.

The bottom 4 carries a bracket 38 upon which a switch box 39 is supported. A cable 40, preferably a multiwire cable with plug connections is laid within the bracket.

Each motor - blower unit 45, 50 is surrounded by an air guiding housing 57 which near the rear wall 3 terminates in a tangential wall 59 which faces a reinforced portion 60. This reinforced portion is forked and its two fork ends 61, 62 which extend approximately parallel to the wall 59 engage a rib 63 on the bottom 4. This rib 63 is located immediately next to the air intake aperture 37. The fork end 61 is fixedly connected to the

rib 63, e.g. by screwing or rivetting, so that in the vicinity of the motor-blower unit the extrusion-pressed air guide housing 57 forms one structural unit with the box section 1, 2, 3, 4. Two carrier plates 52 with air passage apertures 53 are inserted in grooves on the inner side of the air guiding housing 57. The carrier plates are held in position by the air guiding housing 52 which, may be resilient or the sides of which may be drawn towards each other at the walls 59 and 62 by screws 54. The carrier plates 52 carry via bars 51 and rings 46 the motor 45 and thus the motor shaft 47. The motor can also be carried in a different manner, e.g. by feet. As is shown in the right part of Fig. 1, the shaft can carry the blower 50 via a hub 48. The blower consists of two parts, vanes 50 being carried on either side of a member 49.

The air guiding housing has, preferably in the vicinity of the motor, on the side of the flap air suction apertures 58 formed as circumferential slots so that the air can pass from 58 to 53 across the motor. For better cooling, the motor can also be constructed without a casing. A second continuous rib 64 is situated on the bottom 4 spaced from the rib 63.

These continuous ribs 63 and 64 are faced on the top 1 by two parallel ribs 65 and 66 so that if air is to be drawn in due to the use of an extractor fan or merely as a result of reduced pressure in the room to be ventilated, a unit device such as a filter plate which collects dust, absorbs impurities of other kinds and, if desired, also disinfects the air can be fitted between these pairs of ribs in place of the blower and housing 57.

The air guiding housing is covered at its end remote from the motor 45 by a further annular plate 67 likewise inserted in a groove. The reinforced part 60 of the air guiding housing 57 is disposed as close as possible to blower 50 whilst being spaced from the tangential wall 59 of housing 57. Part 60 is thus so shaped as to provide the desired flow conditions in operation and to prevent any return flow from the outlet to the vicinity of suction apertures 58.

For example on the switch box 39 or on the strips 64, 66, a plate 70 can be mounted which carries ultraviolet strip lights 71, 72 which are fed by the cable 73. The ultra-violet lamps can also be replaced by heating or cooling devices. Such lamps or devices are preferably used when the ventilator is intended to conduct fresh air into a room without itself being required to comprise a blower; the ultra-violet lamps as well as the filter can, however, also hinder the escape of health-impairing substances from a room. The filter 43 will thus for example be placed in front of or in the aperture 37.

The manner in which the bracket 38 supports the switch box 39 which can be associated with a series of motor-blower units in a

box section of rectangular shape can be more readily recognised from Fig. 3 and 4. Inside the switch box the motor 76 is supported by supports 74 and 75 but it can also be mounted on the rear wall of the housing. The shaft 77 of this motor drives, as is shown only in Fig. 4, via a reducing gear 78 to 83, the shaft 84 which via a key 85 is fixedly connected to the control disc 86. This disc has in this embodiment a cut out which is formed by two secants 87 and 88 extending approximately at right angles to one another. The control disc carries two cams 89 and 90 which are shown in Fig. 3 to be 120° although for ease of illustration they are shown in Fig. 4, to be 180° apart. These cams co-operate with the cams 91 and 92 of two micro-switches 93, 97 which are mounted on the switch box 39 e.g. by an angle member 94.

The bracket 38 carries a spring 95, the other end of which is fixed at 96 to the free resilient end of the leg 32 so that the spring which is constructed as a tension spring, acting via the parts 32, 31, 30, 28, 29, tends to keep the flap 26 closed. One can readily see that a rotation of the cam disc 86 in the direction of the arrow will via the secant 88 press the lever 32 upwardly and thus open the flap. The flap remains in the open state until the lever 32 engages the secant 87 which has the shaft 84 behind it and gradually slides along the same downwardly in order to assume again the position shown.

It is also possible to provide between the side of the cam disc 86 and on the flap 26 a compression spring which upon rotation of the cam disc directly transmits to the flap the opening and closing movement.

As can be seen from Fig. 4, actually two microswitches 93 and 97 are present, the micro-switch 93 carrying the cam 91 and the micro-switch 97 the cam 92. The cam 91 co-operates with the rotating cam 89 and the cam 92 with the rotating cam 90. As mentioned above Fig. 4 shows the two cams 89, 90 as being displaced with respect to one another by 180°, for the sake of ease of drawing for the same reason in Fig. 4 the two micro-switches 93 and 97 are shown side by side.

In addition Fig. 4 shows the closing of the box section by a plate 98, the edge of which snaps into an inwardly slightly deepening step in the cover 1, inclined wall 2, rear wall 3 and bottom 4.

The conductors issuing from the micro-switches 93 and 97 pass through an insulation 100 in the support 74 (which is dispensed with in the event of direct mounting of the motor 76 on the rear wall of the housing), as well as two insulators 101 and 102 in the bracket 38. In the position according to Fig. 4, the alternating current flows, with the switch 103 closed, from the contact 104 via a safety fuse 105 to the contact 106 of the motor 76. From here the current passes through the contact 107

to the two micro-switches 93 and 97. It can then immediately flow via one of the conductors 108, 109 and a thermoswitch 110 to the other contact 111. On the other hand, the current can also flow through the branch 112 and through the conductor 113 to a plug contact 114 of the blower motor (not shown in this Figure), as well as from there via the other plug contact 115 and the conductor 116 so that it is conducted from the micro-switch 93 to the conductor 108 and from there to the contact 111.

In the explanatory circuit diagram according to Fig. 6, the disc 86 — for simplifying the figure — is resolved into two part-discs 86a and 86b with which the cams 92 and 91 are associated. The reducing gear is omitted and both discs with the motor 76 are mounted on a common shaft 117. In the position of the switch 110 as shown the current flows from the contact 111 on the one hand through the conductor 109 to the contact lever 93, via the upper fixed contact 94 and the conductor 116 to the blower motor 45, and then back to 104 via 114, 113, 112, 105; on the other hand a part-current flows from 109 via the lamp 118 which bridges the motor 45 and indicates the working of the motor. The lamp 118 can also be used as a rheostat resistance for the motor, for example within the conductor 113. All other conductors are dead.

If the switch 110 is now reversed in order to terminate the working of the blower motor 45 and thus the ventilation, the working circuit 111, 110, 109, 93, 94, 116, 115, 45, 114, 113, 112, 105, 104 of the motor is interrupted, whereas a working circuit of the flap actuating motor 76 is now closed. This working circuit for motor 76 leads via the contact 111, the switch 110, the conductor 108, the movable contact 97, the lower fixed contact 119, as well as the conductor 120 to a contact 107 of the motor 76; from there the current flows on via the contact 106 and the conductor 121, as well as the safety fuse 105, back to the contact 104. Consequently the motor 76 now runs and rotates the disc 86 or the two part-discs 86a and 86b. At the beginning of this movement, the movable contact of switch 93 falls off and engages the lower fixed contact 122, and thus prepares a second working circuit for the motor 76. At the instant at which the cam 91 of the part-disc 86b reaches its upper position, it raises the movable contact 97 of the micro-switch and places it against the dead contact 123. Now both conductors 108 and 109 are interrupted at 97 and 110 so that the motor 76 is without current.

If one now intends to ventilate the room again, the switch 110 is again brought into the position shown in the drawing. A current then flows from 111 via 110, 109, 93, 122, 120, 107 to the motor 76 and from there via 106, 121, 105 back to 104. The flap actuating motor 76 is thus started and rotates the disc

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86 or the part-discs 86a, 86b. First the cam 91 allows the movable contact 97 to fall off so that a second conductor to the motor 76 is prepared, which is, however, at this instant still interrupted by the position of the throw-over switch 110. Since however the current is now supplied via 111, 110, 109, 93, 122, 120, 107, the motor 76 continues to rotate further and opens the flap 26 (not shown in this Figure). Only when the cam 92 raises the movable contact 93 is the circuit of the motor 76 interrupted and the motor stops. At the same time the blower motor 45 is thus fed via 111, 110, 109, 93, 94, 116, 115 on the one hand and 114, 113, 112, 105, 104 on the other hand and starts. This means furthermore that the motor only starts when the flap is opened. The flap need thus not be moved against the suction effect of a reduced pressure in the fan.

With an unclean, e.g. a fatty or very dusty air, the aperture which is closed by the flap 26, can be covered on the inside by an easily cleanable and preferably exchangeable filter which protects the fan and has an aperture for the lever 32.

The front view according to Fig. 7 shows the upper closure portion 10, the lower closure portion 9 in the vicinity of a flap 26 and a broken off intermediate member 126 to which a further unit comprising two blowers and a motor can be connected. The control housing 39 and a fan housing 57 with a motor 45 are indicated in broken lines in Figure 7.

#### WHAT I CLAIM IS:—

1) A ventilator adapted to be mounted in a window, door or wall opening and comprising a box like housing open on one side and having on the open side a closure including a movable flap, the top and bottom of said housing each having on their edge facing the open side a continuous ledge and spaced inwardly therefrom a projection, said closure

having at the top and bottom thereof grooves adapted to receive said ledges and rearwardly directed resilient strips the ends of which are engageable with said projections.

2) A ventilator as claimed in claim 1 wherein said projections are in the form of ribs having rounded or inclined surfaces which are engaged by hook like ends on said resilient strips.

3) A ventilator as claimed in claim 1 or 2 wherein said flap has supporting strips extending along its inner side by which flap setting means are connected to the flap.

4) A ventilator as claimed in any of claims 1 to 3 including a motor driven blower in an air guiding housing, a wall of said air guiding housing which bounds a discharge opening therefrom being rigidly connected to an inwardly protruding rib on the bottom of the box like housing.

5) A ventilator as claimed in claim 4 wherein said wall of the discharge opening is secured to an opposite wall thereof by screws or rivets.

6) A ventilator as claimed in claim 4 or 5 wherein pairs of equally spaced parallel strips are provided on the inside of the top and bottom of said box like housing.

7) A ventilator as claimed in any of the preceding claims including a flap actuating motor which is operatively connected to said flap through the intermediary of a cam disc, said cam disc having a part thereof cut out which is limited by two secants extending approximately at right angles to one another and which does not contain the axis of the disc.

8) A ventilator substantially as described with reference to the accompanying drawings.

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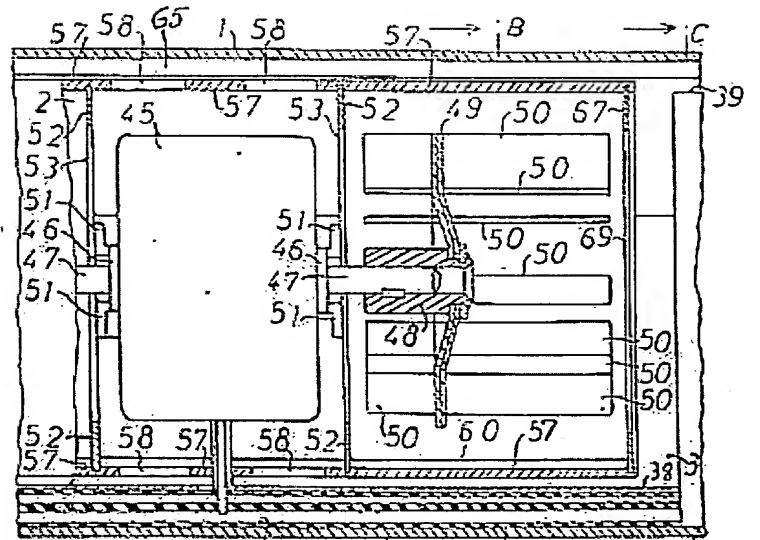


FIG. 1

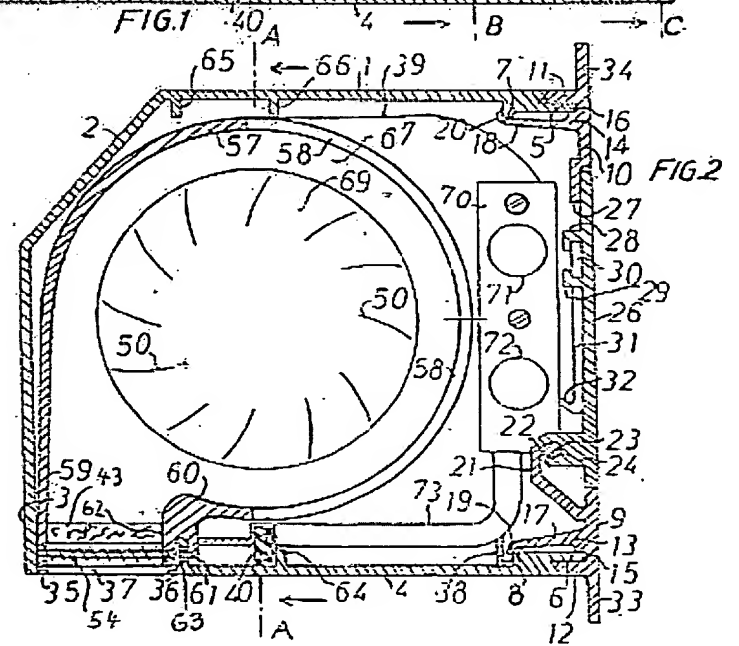


FIG. 2

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3 SHEETS

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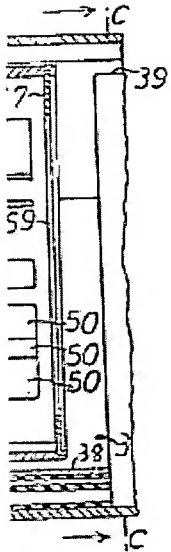


FIG. 2

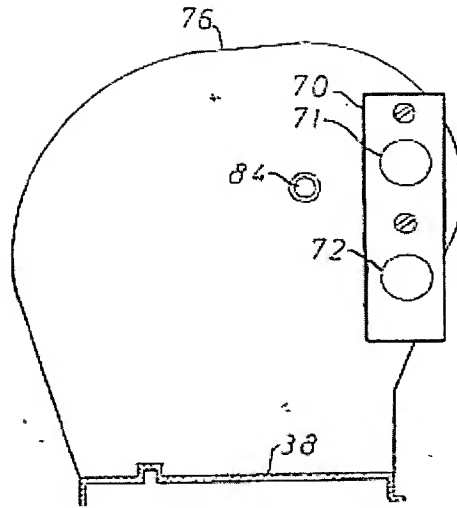


FIG. 5

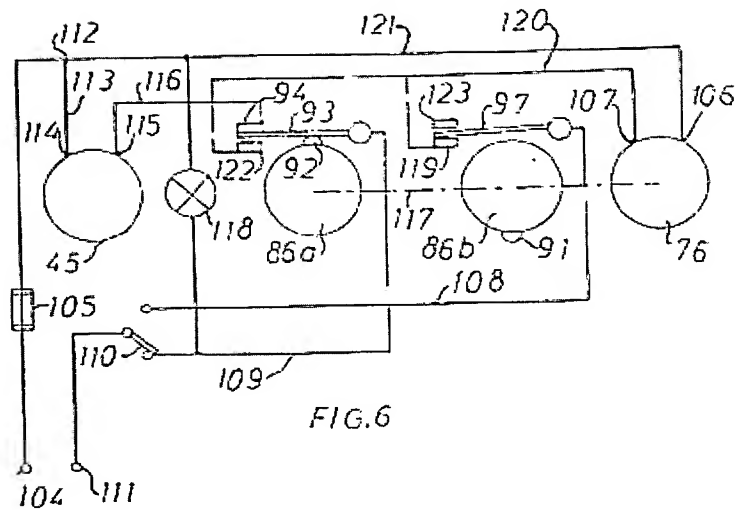
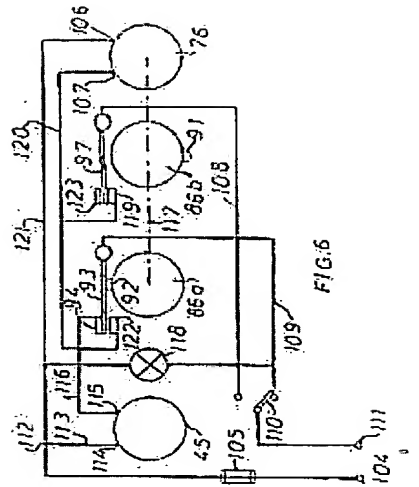
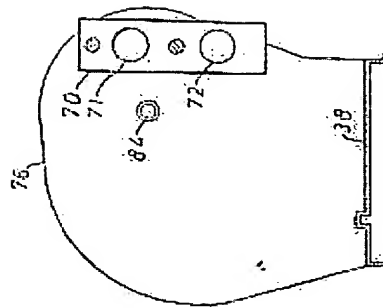
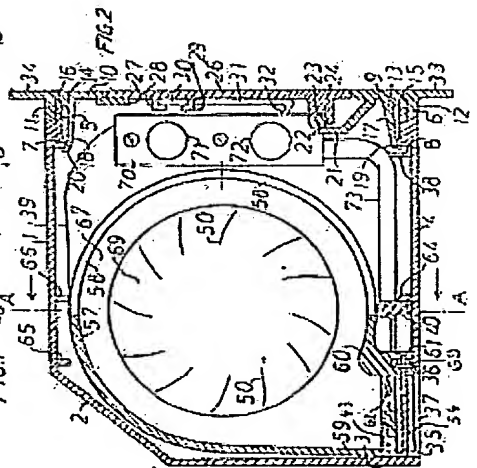
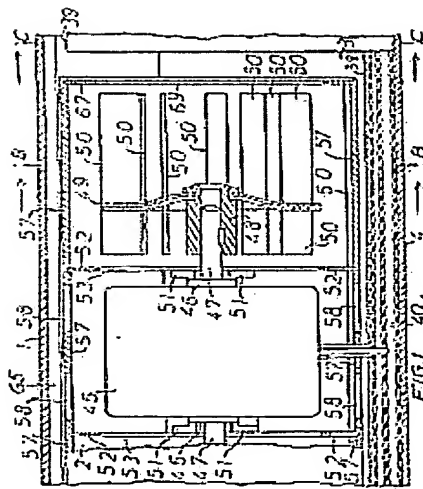
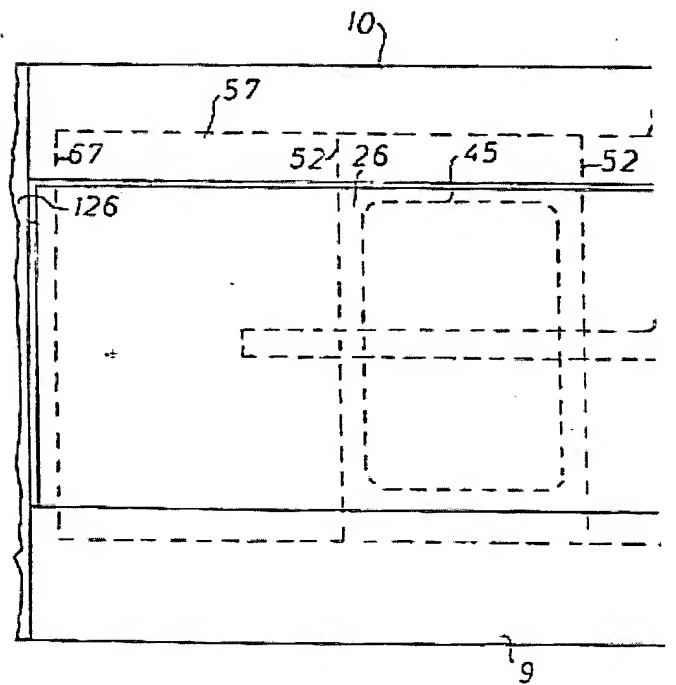
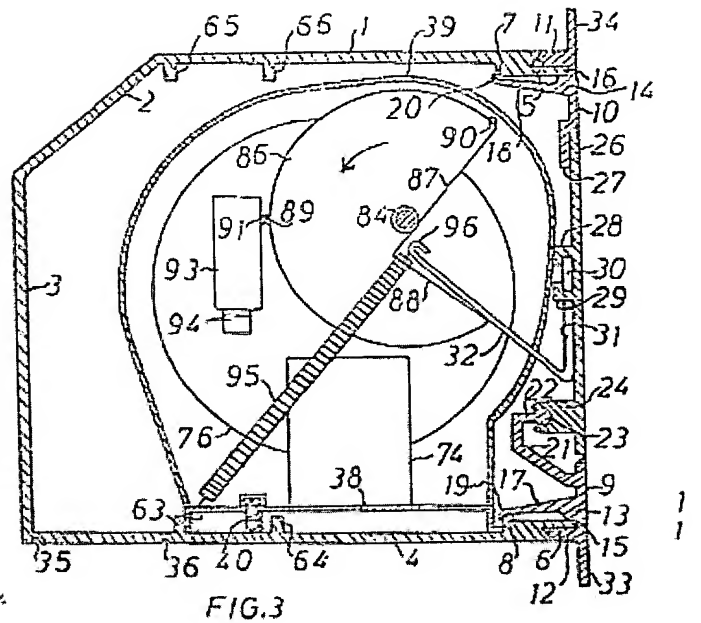


FIG. 6

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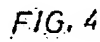
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Sheet 2



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